

REMARKS

Claims 1-11 and 13-29 are pending in the subject application. Claims 1-26 have been examined, and claims 1-5, 8, 9, 11, 14 and 16-26 stand rejected. Applicants acknowledge and appreciate the Examiner's indication that claims 6, 7, 10, 12, 13 and 15 are objected to and would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. Applicants further acknowledge and appreciate that claims 16-26 would be allowable if amended to overcome certain 35 U.S.C. § 112, 2nd paragraph rejections as noted below.

By way of the above amendments, claims 1, 13, 16, 18-21 and 23-25 have been amended, claim 12 has been canceled, and new claims 27-29 have been added. Support for the new and amended claims can be found throughout the specification. Favorable reconsideration of the application and allowance of all of the pending claims are respectfully requested in view of the above amendments and the following remarks.

As noted above, Figs. 10 and 11 have been amended to remove horizontal portions of the silicon nitride layers 12 shown at the upper right hand corners of these figures. No new matter has been shown in these figures.

The drawings have been objected to under 37 CFR § 1.83(a), because the Examiner asserts that the roughening step in claims 1, 16 and 21 is not shown in the drawings. The Examiner requires this feature to be shown or canceled from these claims. This objection to the drawings is respectfully traversed, and Applicants submit that this feature of the claims is adequately shown in the figures.

The figures of the application illustrate the sequence of claimed processing steps by showing the semiconductor structure formed at varying stages after certain process steps are performed. With regard to the roughening step recited in the claims, the resultant structure formed from this roughening step is clearly shown in Fig. 12 of the application. In particular, Fig. 12 shows the microscopic shape of a roughened silicon surface having a curved macroscopic surface and which is roughened to form pores 34, 35 and 36, where the pores can have structural size dimensions of less than 20 nm, including a depth d of less than 20 nm and a width w of less than 20 nm.

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The roughened silicon surface shown in Fig. 12 represents, e.g., the structure formed in sequence between Figs. 1 and 2 (i.e., after formation of trenches 5 and silicon nitride layers 12 as shown in Fig. 1, but before the thermal oxidation step to form the silicon dioxide layer or isolation collar 9 as shown in Fig. 2). Thus, since the resultant structure is shown from the roughening step, the Examiner is requested to withdraw the objection to the drawings.

Claims 16-26 stand rejected under 35 U.S.C. § 112, 2nd paragraph. In this rejection, the Examiner asserts that the recitation in independent claims 16 and 21 of a step for exposing the silicon surface region/portion of the lower portion of the trench and a step for roughening the surface of the curved silicon surface region in the lower portion of the trench is unclear. The Examiner suggests replacing the language “roughening the surface of the curved silicon surface region” in each of these claims with “roughening the exposed silicon surface region.” These claims (as well as some of their dependent claims) have been amended in accordance with the Examiner’s suggestion.

In addition, the Examiner indicates that the term “the silicon dioxide layer” in claim 21 lacks antecedent basis. Claim 21 has been amended to correct this antecedent basis problem. The Examiner is now requested to withdraw the rejection of claims 16-26 based upon 35 U.S.C. § 112, 2nd paragraph, and to allow these claims.

Claims 1-5, 8, 11 and 14 stand under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 6,025,225 to Forbes et al. in view of U.S. Patent No. 5,981,350 to Geusic et al. In addition, claim 9 stands rejected under 35 U.S.C. §103(a) as being obvious over Forbes et al. in view of Geusic et al. and further in view of U.S. Patent No. 5,739,565 to Nakamura et al.

As noted above, the Examiner indicates that claims 6, 7, 10, 12, 13 and 15 as well as claims 16-26 contain allowable subject matter.

Claim 1 has been amended to include the limitations of claim 12 (now canceled). Accordingly, Applicants submit that claim 1 should now be allowed over the cited art. In addition, since claims 2-5, 8, 9, 11, 14 and 26 depend from claim 1, these claims should also be allowed over the cited art. The Examiner is therefore requested to withdraw the prior art rejections of these claims and to allow claims 1-11, 13-15 and 26.

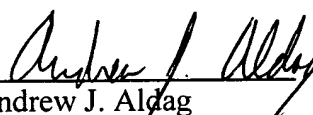
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New claim 27 recites the subject matter of original claim 6 (i.e., the combination of original claims 1, 4 and 6), while new claim 28 substantially recites the subject matter of original claim 10 (i.e., the combination of original claims 1, 4, 8, 9 and 10), and new claim 29 recites the subject matter of original claim 15 (i.e., the combination of original claims 1 and 15). These new claims should also be allowed, since the Examiner has already indicated that claims 6, 10 and 15 contain allowable subject matter.

In view of the foregoing, the Examiner is respectfully requested to find the application to be in condition for allowance with claims 1-11 and 13-29. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Applicant hereby petitions for any extension of time that may be required to maintain the pendency of this case, and any required fee for such extension is to be charged to Deposit Account No. 05-0460.

Respectfully submitted,


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Amendment**U.S. Patent Application No. 10/823,607****Amendments to the Drawings:**

The attached sheets of drawings include changes to Figs. 10 and 11. In particular, the horizontal portion of the silicon nitride layer 12 shown at the upper right hand corner of each of Figures 10 and 11 has been removed to correspond with the other layers 12 shown in these figures.

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APPENDIX



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FIG 11

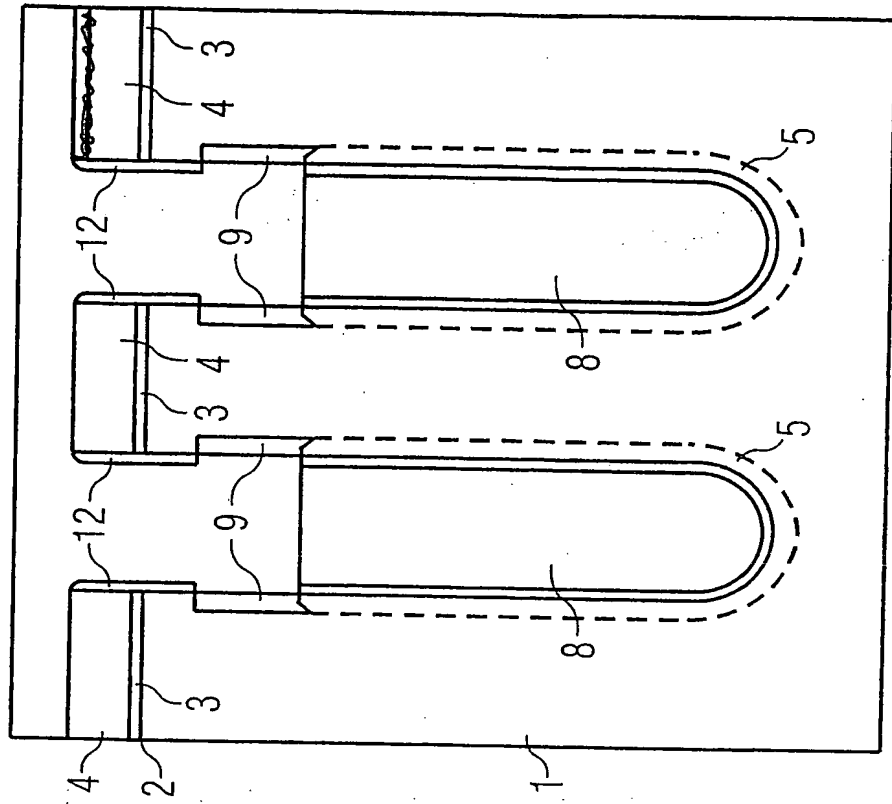


FIG 10

